15. (Twice Amended) The gas scrubber according to claim 7, wherein said wetting chamber further includes:

a case comprising the plurality of partitions;

a plurality of absorbers installed in a region interior to the plurality of partitions, wherein said plurality of absorbers are at least partially drenched in water for dissolving water soluble elements contained in the gas as the gas flows through the plurality of absorbers;

a shower nozzle having a water delivery opening directed above each of said plurality of absorbers for drenching said plurality of absorbers; and

an exhaust pipe having an opening extending into the case for expelling a portion of said gas to an ambient outside of said case.

REMARKS

Claims 1, 6, 7, and 15 have been amended. Thus, claims 1-21 are currently pending in the case. Further examination and reconsideration of the presently claimed application is respectfully requested.

Section 112, First Paragraph, Rejection:

Claim 6 was rejected under 35 U.S.C. § 112, first paragraph, for containing subject matter which was not described in the specification. To expedite prosecution, claim 6 has been amended. This amendment is believed to address the concerns expressed in the Office Action. Furthermore, as set forth in detail below, the limitations of claim 6 are taught by the Specification.

Claim 6 recites:

> The gas scrubber according to claim 5, wherein the combustion chamber comprises a relatively high temperature gas, wherein the wetting chamber comprises a relatively low temperature gas, and wherein the conditioned gas prevents the high temperature gas from coming in contact with a substantial portion of the low temperature gas.

The Office Action states that, "the specification does not explain the manner of delivery of [the] conditioned gas that causes the gas delivered from the combustion chamber to avoid directly contacting a substantial portion of the cooler gas." More specifically, the Office Action states "[i]t remains unclear where the hot and cold gas mixing might occur and how the gas from nozzle 62 prevents this mixing."

On the contrary, the Specification does explain where the hot and cold gases mix and how the introduction of the conditioned gas prevents direct contact of these two gases. In particular, the Specification clearly states that the mixing of the hot gas from the combustion chamber with the cool gas from the wetting chamber generally takes place at the interface between the combustion chamber and the wetting chamber. For example, the Specification recites:

> Due to the temperature difference between the combustion chamber and the wetting chamber, powder or particulate buildup is created at the interface between the two chambers. It is believed the powder results from the relatively hot gas of the combustion chamber contacting a cooler gas or a cooler surface of the wetting chamber." (Specification -- pg. 3, lines 24-28).

A means for reducing the formation of such powder or particulate includes guide plate 61, arranged at the interface between the two chambers, and injection nozzle 62 installed on all four sides of the guide plate. Injection nozzle 62 is adapted to continuously supply air or nitrogen to the funnel-shaped plate material 61A attached to guide plate 61. More specifically, nozzle 62 may supply ambient air or nitrogen (conditioned gas) to the hot gas at the guide plate interface, such that mixing occurs between the hot gas and the conditioned gas, causing the temperature of the combined gases to be lower than the temperature of the hot gas. In this manner, the continuous application of a conditioned gas between the combustion and wetting chambers, as taught by the presently claimed case, may reduce the temperature differential between the two chambers, thereby reducing or eliminating the amount of powder produced. Thus, the conditioned gas supplied by nozzle 62 prevents the hot combustion chamber gas from directly

contacting a substantial portion of the cooler wetting chamber gas. Further support is cited on pg. 10, lines 6-11 of the Specification:

> Due to the temperature difference between the high temperature process of the combustion chamber 10 and low temperature process of the wetting chamber 30, a powder could be created above or on [guide] plate 61. However, continual application of air and nitrogen to a space of the plate 61 blocks possible contact between air of the combustion chamber 10 and air of the wetting chamber, and thus creation of a powder is substantially prevented.

The Office Action questions, "What does it mean to supply gas to a material? And how does supplying gas to a material prevent a high temperature gas from contacting a low temperature gas?" In particular, the statement regarding supplying a gas to plate material 61A may refer to projecting gas across plate material 61A. As explained above, guide plate 61 and plate material 61A comprise the interface between the combustion and wetting chambers. In addition, a conditioned gas injected into this region may block the hot gas from the combustion chamber from coming in direct contact with the cool gas from the wetting chamber. As noted above, such a teaching is well supported in the Specification. Therefore, it is asserted that one skilled in the art of a gas scrubbing apparatus would understand "supplying gas to a material" as applying gas across such a material.

Moreover, the Office Action states that "[a]nother source of confusion is the nature of the contact between the gas from the combustion chamber and the cooler gas." In particular, the Office Action questions the nature of contact between gases, such that the hot gas does not directly contact a substantial portion of the cooler gas. As described above, a conditioned gas (air or nitrogen) from nozzle 62 is injected across the interface between the combustion and wetting chambers, such that the conditioned gas mixes with the hot gas, thereby preventing the hot gas from directly contacting a substantial portion of the cooler gas. The term "substantially" is used, in such a case, to broaden the limitation of the claim. In particular, the phrase "does not contact a substantial portion" indicates that it may be possible for a small portion of the hot gas from the combustion chamber to come in contact with a small portion of the cool gas from the wetting chamber. Such a limitation, however, does not exclude the possibility that the hot gas will be prevented from coming in contact with all of the cooler gas.

Therefore, it is asserted that the manner of delivering the conditioned gas, such that gas delivered from the combustion chamber may avoid direct contact with the cooler gas of the wetting chamber, is taught and explained by the Specification. Furthermore, it is taught by the Specification that the combustion chamber comprises a relatively high temperature gas and the wetting chamber comprises a relatively low temperature gas. The Specification also teaches that a conditioned gas prevents the high temperature gas from coming in contact with a substantial portion of the low temperature gas. As such, the limitations of claim 6 are taught in the Specification. Accordingly, removal of the § 112, first paragraph, rejection of claim 6 is respectfully requested.

Section 112, Second Paragraph, Rejection:

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. As will be set forth in more detail below, this rejection is respectfully traversed.

Statements in the Office Action reject claim 2 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. A claim is said to be indefinite when it contains words or phrases whose meaning is unclear, however, the failure to provide explicit antecedent basis for terms does not always render a claim indefinite. If the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite. *Ex Parte Porter*, 25 USPQ2d 1144, 1145 (Bd. Pat. App. & Inter. 1992) MPEP 2173.05(e).

The statement in the Office Action stating that claim 1 defines "the gas" as gas directed from the combustion chamber into the wetting chamber is respectfully traversed. First, claim 1 is a device claim, not a method claim. The sequence of the claim elements introduced for a device claim does not present the order in which they are used or the steps of a process. Rather, elements of a device claim simply list the components of the device. Second, "the gas" is not a claimed element of the gas scrubber in device claim 1. In contrast, claim 1 uses "the gas" as a functional limitation of the guide plate component of the claimed gas scrubber. In particular, claim 1 states that a guide plate may be used to direct the gas from the combustion chamber into the wetting chamber. Such a limitation, however, does not restrict the gas to a particular

location within the gas scrubber. "The gas" is a term used to further explain the functional limitation of the guide plate, and therefore may be used to define other components of the gas scrubber, regardless of its location reference within the scrubber.

Subsequent to claim 1, claim 2 recites that the combustion chamber is "adapted to burn flammable elements of the gas." The Office Action argues, "if 'the gas' is the gas that has already left the combustion chamber presumably never to return, it is not clear how the combustion chamber can then burn flammable components of the gas." As in claim 1, the inclusion of "the gas" in claim 2 is not used to define the location of the gas, but rather to further define the function of a gas scrubber component (i.e. the combustion chamber). The objective of the presently claimed case is to present a "gas scrubber to treat the flammable and noxious elements of the gas" (Specification -- pg. 4, lines 13-14). In order to remove such unwanted elements, it would be evident to one skilled in the art that "the gas" would undergo a transformation at each step in processing, thus "the gas" emerging from the combustion chamber would not be the same as "the gas" emerging from the wetting chamber. It is, therefore, asserted that the limitation of claim 2 is definite.

For at least the reasons cited above, the limitation of claim 2 is asserted to be definite. Consequently, the removal of the § 112, second paragraph, rejection of claim 2 is respectfully requested.

Section 103(a) Rejections:

Claims 1-3, 5-8, 14, 15, and 18-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,900,217 to Hartung et al. (hereinafter "Hartung"). Claims 4, 9-13, 16, and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hartung in view of Korean Patent No. 97-9311 to Kim (hereinafter "Kim"). To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. As set forth in more detail below, the rejections of claims 1-21 are respectfully traversed.

None of the cited art teaches or suggests a gas scrubber comprising a wetting chamber placed below a combustion chamber, and including a means for minimizing the production and/or accumulation of a powder at the interface between a combustion chamber and a wetting chamber. Claim 1 recites, in part:

> . . . a wetting chamber placed below said combustion chamber . . . and an injection nozzle . . . adapted to deliver a conditioned gas above the guide plate for minimizing the production and/or accumulation of a powder at an interface between the combustion chamber and the wetting chamber.

Hartung discloses an apparatus for purifying waste gases including a waste gas nozzle 14 which is directed downwards into the combustion space 6, and that the reaction products, formed during the combustion process, are passed upwards along the inside of the outer pipe 1 into the scrubbing space 7 (see Fig. 1). Inside the scrubbing space, spray nozzle 18 disperses an absorbent to the reaction products such that they are discharged along the inner side of the outer pipe to basic body 2, and out drain 4. Therefore, Hartung teaches a gas scrubbing apparatus with a scrubbing space located above a combustion space, not below as in the presently claimed case. Although Hartung further discloses, "an effect of the combustion process by residues of the combustion, which are deposited . . . on the interior side of the outer combustion pipe . . . is avoided" (Hartung -- col. 2, lines 9-13, emphasis added), modification of Hartung's design would not produce the same results. For example, if Hartung's scrubber was modified to place the scrubbing chamber below the combustion chamber, spray nozzle 18 would disperse absorbents to reaction products in the wetting chamber, such that reaction products and residues are flushed into the basic body and out through a drain arranged at the bottom of the wetting chamber. In order to dispose of reaction products through the drain, spray nozzle 18 would not bathe the interface between the combustion and wetting chambers with absorbents, and thus no means would exist to prevent a powder formation at the interface.

On the other hand, Kim does teach a gas scrubber having a wetting chamber below a combustion chamber. However, since Kim does not teach or suggest a powder formation of any kind, there is no motivation to include a means to prevent such a powder formation, and therefore no motivation to include an injection nozzle with conditioned gas at the interface between chambers. Thus, there would be no motivation for one skilled in the art to combine the

teachings of Hartung and Kim to incorporate a wetting chamber below a combustion chamber, while providing an injection nozzle at the interface to prevent powder formation.

None of the cited art teaches or suggests a gas scrubber comprising a wetting chamber, including a plurality of partitions to direct a gas through a plurality of absorbers, including a means for minimizing a powder formation at the interface between a combustion chamber and a wetting chamber. Claim 7 states in part:

> A gas scrubber comprising . . . a wetting chamber placed below said combustion chamber . . . wherein said wetting chamber includes a plurality of partitions to direct the gas from said combustion chamber through a centralized region of the wetting chamber; and a means for minimizing a powder produced at an interface between said combustion chamber and said wetting chamber.

Support for the above limitation may be found, for example, on page 8, lines 5-8, of the Specification stating after passage through the combustion chamber, "the gas flows into the wetting chamber 30, which is placed below the combustion chamber 10 forming a single unit. The wetting chamber 30 comprises a case having a central part that is formed with a plurality of partitions 31a configured to form a passage . . ." Such partitions create a passage with a distinct inlet and outlet, requiring the gas to follow a particular path through the wetting chamber. In this manner, "the path at which the gas takes becomes longer and the effectiveness of the absorbing process is increased" (Specification -- pg. 10, lines 21-22). Also, as the gas progresses in an "up and down flow" through the plurality of partitions, "the gas is cooled due to a cooling effect of water." (Specification -- pg. 10, lines 18-20).

Kim discloses a wet chamber 40 "configured in a spiral shape by partitions 42-45 and outer walls 46" (Kim -- pg. 6, lines 1-2), such that gas is directed through the absorbers located in each partition. However, Kim does not teach a means for minimizing a powder formation at the interface between combustion chamber 10 and wetting chamber 40.

Conversely, Hartung discloses a means for reducing "residue[s] of combustion" (Hartung -- col. 2, line 10), but does not teach a wetting chamber consisting of a plurality of partitions to direct gas through a plurality of absorbers. Moreover, Hartung does not suggest creating a passage through a plurality of absorbers, such that the length of the gas flow path is

increased, resulting in an increased effectiveness of the water absorption process. According to Hartung's design, "waste gases . . . are passed as reaction gases from the basic body 2 to the inside of the outer pipe 1 upwards into the scrubbing space 7" (Hartung -- col. 4, lines 59-62). The reaction gases are allowed to pass through the inside of outer pipe 1 to scrubbing space 7 on either side of inner pipe 16, such that no particular path is followed to direct gases through the scrubbing space. After reaction gases are sprayed with absorbents in the scrubbing chamber, the byproducts are then discharged back through the same path in which they entered the scrubbing chamber. Therefore, Hartung presents no motivation to include a plurality of partitions configured to form a passage, with an inlet and outlet, through the scrubbing space. Even if Hartung's gas scrubber was modified to include partitions within the wetting chamber, such that waste gases from the combustion chamber were passed along one side of inner pipe 16, and waste gases from the wetting chamber were passed along the other side of inner pie 16 to drain 4, such an apparatus would not include the limitations of claim 7. In particular, spray nozzle 18 would only disperse absorbents to the waste gases in the wetting chamber along the side of inner pipe 16, and therefore would not spray the interface between the combustion chamber and the wetting chamber. Therefore, it would not be obvious to one skilled in the art to combine the teachings of Kim and Hartung to teach or suggest all limitations of claim 7.

For at least the reasons cited above, it would not be obvious for one skilled in the art to combine the teachings of Hartung and Kim in such a manner as to teach all the limitations of the presently claimed case. Therefore, the removal of the §103(a) rejection of claims 1-21 is respectfully requested.

NOTICE OF CHANGE OF ADDRESS

The Commissioner is respectfully requested to change the correspondence address for the above-identified patent application as follows:

New Address:

Kevin L. Daffer
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CONCLUSION

In this response, claims 1, 6, 7, and 15 have been amended. Applicant has responded to the rejections of claims 1-21. Therefore, this response constitutes a complete response to all issues raised in the Office Action dated September 13, 2001. In view of the remarks traversing the rejections, Applicant asserts that pending claims 1-21 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

No fees are required for filing this amendment; however, the Commissioner is authorized to charge any additional fees, which may be required, or credit any overpayment, to Conley, Rose & Tayon, P.C. Deposit Account No. 50-1505/5480-00200/KLD.

Respectfully submitted,

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Date: 11/20/01
JMF

ATTACHMENT A
"Marked-Up Amendments

IN THE CLAIMS:

Please amend claims 1, 6, 7, and 15 as follows:

1. (Twice Amended) A gas scrubber comprising:

a combustion chamber;

a wetting chamber placed below said combustion chamber to form a single unit;

a guide plate arranged between the combustion chamber and the wetting chamber for directing a gas from the combustion chamber into the wetting chamber; and

an injection nozzle having an opening adapted to deliver a conditioned gas above the guide plate [during operation of the gas scrubber] for minimizing the production and/or accumulation of a powder at an interface between the combustion chamber and the wetting chamber.

6. (Twice Amended) The gas scrubber according to claim 5, wherein the [gas delivered from the] combustion chamber [is] comprises a relatively high temperature gas [that cools as it traverses the plurality of water drenched absorbers, and wherein the conditioned gas is delivered above the guide plate such that the gas delivered from the combustion chamber does not directly contact a substantial portion of the cooler gas that traverses the plurality of water drenched absorbers], wherein the wetting chamber comprises a relatively low temperature gas, and wherein the conditioned gas prevents the high temperature gas from coming in contact with a substantial portion of the low temperature gas.

7. (Thrice Amended) A gas scrubber comprising:

a combustion chamber for eliminating explosive and flammable elements contained in a gas delivered into the combustion chamber from a gas intake;

a wetting chamber placed below said combustion chamber to receive the gas from the combustion chamber and dissolve a water soluble element of the gas, wherein said wetting chamber includes a plurality of partitions to direct the gas from said combustion chamber through a centralized region of the wetting chamber; and

a means for minimizing a powder produced at an interface between said combustion chamber and said wetting chamber[, wherein said means for minimizing is adapted to operate during the operation of the gas scrubber].

15. (Twice Amended) The gas scrubber according to claim 7, wherein said wetting chamber further includes:

a case comprising the plurality of partitions [to direct the gas from said combustion chamber through a centralized region of the case];

a plurality of absorbers installed in a region interior to the plurality of partitions, wherein said plurality of absorbers are at least partially drenched in water for dissolving water soluble elements contained in the gas as the gas flows through the plurality of absorbers;

a shower nozzle having a water delivery opening directed above each of said plurality of absorbers for drenching said plurality of absorbers; and

an exhaust pipe having an opening extending into the case for expelling a portion of said gas to an ambient outside of said case.